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UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

AND

MINERALS MANAGEMENT SERVICE

RECLUSE REVIEW AREA TRACT PROFILE

BITTER CREEK

Casper, Wyoming

February 1983

RECLUSE REVIEW AREA TRACT PROFILE: BITTER CREEK

PART I: SITE-SPECIFIC ANALYSIS OF THE BITTER CREEK LEASING TRACT (by Bureau of Land Management)

PART II: SUMMARY REPORT--BITTER CREEK TRACT (by Minerals Management Service)

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

PART I

Site-Specific Analysis
# of the
Bitter Creek Coal Leasing Tract
Campbell County, Wyoming

CASPER DISTRICT OFFICE

Casper, Wyoming

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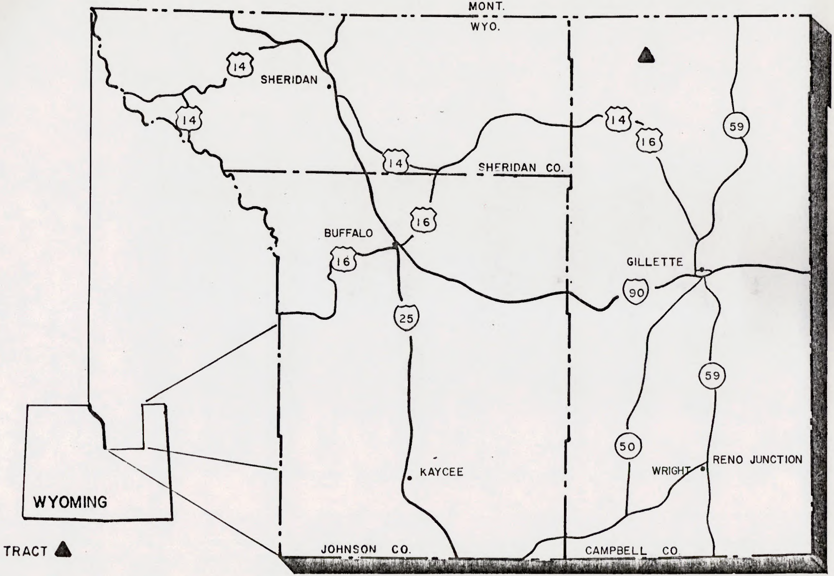
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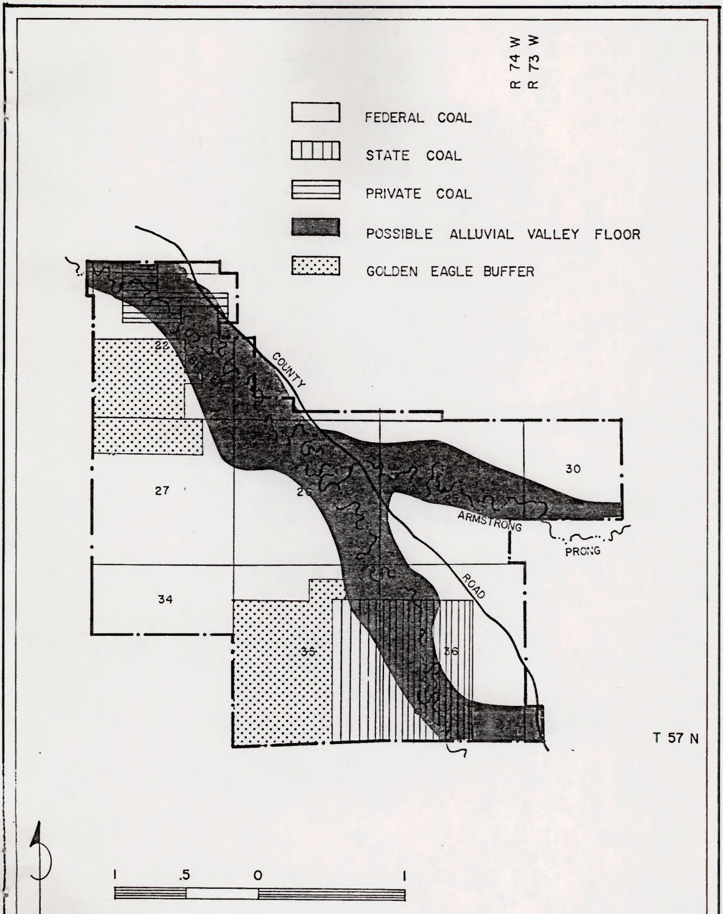
RENO JUNCTION
WRIGHT
KAYCEE
TRACT
JOHNSON CO.
CAMPBELL CO.

LOCATION



BITTER CREEK TRACT

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is to offer for competitive leasing a 4,710-acre tract of land in northern Campbell County, Wyoming. The Bitter Creek tract, which contains 368 million tons of recoverable coal, comprises an area identified by the Minerals Management Service as an economical mining unit for development of a 30-year surface mining operation. It is north of Gillette near the Wyoming-Montana state line. The maps preceding this page show the location and give the legal description of the tract.

When the preliminary work was done for this tract, the Bureau of Land Management (BLM) and Minerals Management Service (MMS) were separate agencies in the Department of the Interior. The Secretary of the Interior recently announced that the onshore minerals functions of the two agencies are to be consolidated. However, for the purposes of this document we will use the former names in describing the actions taken by each agency.

The Bitter Creek tract contains 339 million tons of federal coal, 56 million tons of state coal, and 14 million tons of private coal (in-place reserves). The annual production from the mining unit would be 12.3 million tons.

Approximately 500 persons would be employed by this mine at peak employment. It will be noted that this projection is higher than the projection provided in the MMS summary report (Part II of this document). For the purpose of this analysis, the higher employment projection will be used to provide a "worst case scenario."

About 161 acres of surface would be disturbed each year after 1987. A total of 4,710 acres would be disturbed by mining. About 320 acres would be used for mine facilities and 735 acres for railroad access. Relocation of a graveled county road would require 90 acres, and upgrading of the access road, 50 acres. Part II contains more specific information on the proposed mining operation.

It is assumed that proper mining and reclamation would be carried out according to existing state and federal regulations, including the regulations of the Office of Surface Mining Reclamation and Enforcement (30 CFR 700-899) and the Environmental Protection Agency (40 CFR 0-399), as well as regulations for the coal management program of the Department of the Interior (30 CFR 211, 43 CFR 23, and 43 CFR 3400) and the regulations of the Wyoming Department of Environmental Quality (DEQ).

When the Recluse Review Area coal amendment to the Eastern Powder River Basin Management Framework Plan was prepared (USDI, BLM 1982), the unsuitability criteria of the federal coal management program were applied to lands designated as having high-moderate coal potential. Buffer zones have been established for two golden eagle nests on the tract. These buffer zones are unsuitable for mining. The potential alluvial valley floor in the Bitter Creek valley is acceptable for development pending further study.

THE AFFECTED ENVIRONMENT

GEOLOGY AND TOPOGRAPHY

The geology of the Bitter Creek tract is described in Part II, the tract summary report prepared by the MMS.

The tract's topography varies from steep, rugged hills in the southwest half and in the very northeast corner of the tract to the wide, gentle valley of Bitter Creek, which bisects the tract from southeast to northwest. Tributary drainages to Bitter Creek form dendritic patterns in the more hilly areas. Elevations range from a low of 3,680 feet in the northwest corner of the tract along Bitter Creek to 3,940 feet in the northeast corner and 4,100 feet in the southwest corner of the tract.

SOILS AND VEGETATION

Soils in the Bitter Creek tract are loamy and fine-textured. The pH ranges from neutral to moderately alkaline. The depth to bedrock generally is less than 20 inches, but it may vary to more than 40 inches. Permeability varies from moderate to slow, and erodibility is medium. (Soils information is from the *Wyoming General Soil Map*--U. of Wy. Ag. Exp. Sta. 1977.)

There are four major ecological types in the tract. The characteristics of each type are shown below, and the most common species in each are listed. (Acreages do not include cropland in the tract.)

Open Juniper Forest with Upland Mixed Shrub--745 acres

Cover: Trees, 20-80%; shrubs, more than 20%; herbs, less than 20%

Species:

Rocky Mountain juniper [*Juniperus scapulorum*]
Big sagebrush [*Artemisia tridentata wyomingensis*]
Skunkbush sumac [*Rhus trilobata*]
Snowberry [*Symphoricarpos oreophilus*]
Bluebunch wheatgrass [*Agropyron spicatum*]
Indian ricegrass [*Oryzopsis hymenoides*]

Open Upland Herbaceous with Upland Mixed Shrub--1,600 acres

Cover: Herbs, 60-80%; shrubs, 20-40%

Species:

Bluebunch wheatgrass
Little bluestem [Andropogon scoparius]
Indian ricegrass
Prairie junegrass [Koeleria cristata]
Big sagebrush
Skunkbush sumac
Snowberry
Yucca [Yucca glauca]

Open Sagebrush with Herbaceous--1,400 acres

Cover: Shrubs, 40-60%; herbs, 40-60%

Species:

Big sagebrush
Western wheatgrass [Agropyron smithii]
Needle-and-thread grass [Stipa comata]
Sandberg's bluegrass [Poa secunda]
Prairie junegrass
Rabbitbrush [Chrysothamnus sp.]

Open Herbaceous with Scattered Riparian Deciduous Trees--30 acres

Cover: Herbs, 60-80%; trees, 20-40%

Species:

Western wheatgrass
Kentucky bluegrass [Poa pratensis]
Cottonwood [Populus angustifolia]
Boxelder [Acer negundo]
Peachleaf willow [Salix amygdaloides]
Big sagebrush

WATER RESOURCES

Surface water

The entire tract lies within the Bitter Creek watershed and drains to the northwest. Bitter Creek drains an area of 52 square miles north of the tract boundary. There are no periennial streams in the tract.

The estimated mean annual flow of Bitter Creek is 4.20 cubic feet per second (cfs). This estimate was calculated by the basin characteristics method of Lowham (1976). The estimated ten-year peak flow is 1,833 cfs.

There are several small impoundments in the tract that are used primarily for livestock watering.

No data are available on surface water quality in the tract. In general, surface waters in the region tend to be highly mineralized, with total dissolved solids concentration of more than 1,000 milligrams per liter (mg/1). The major cations are usually calcium, magnesium, and sodium, and the major anion is sulfate.

Alluvial Valley Floors

Shallow groundwater exists and subirrigation appears to be occurring in the bottom of the Bitter Creek valley. The valley appears to meet the criteria for an alluvial valley floor. The final determination as to the existence and extent of alluvial valley floors in the tract is pending.

Groundwater

The tract contains one to three permitted wells. Available information does not pinpoint the locations of existing wells precisely but enough to indicate whether they are inside or outside the tract; therefore, the exact number in the tract is not known. It is likely that there are additional livestock wells for which water rights have not been filed.

Water is available from the Fort Union Formation, with yields of 2 gallons per minute (gpm) typical. The Fort Union Formation, which may be 3,000 feet thick or more in this area, consists of fine-grained sandstone, interbedded shale, carbonaceous shale, and coal. Water is obtained from sandstone, jointed coal, and clinker beds. Reported specific capacities range from about 0.4 to 0.7 gpm per foot of drawdown.

In the vicinity of the Bitter Creek tract, water is available at depths of less than 300 feet. It tends to be high in dissolved solids, typically with concentrations higher than 2,000 mg/1. The dominant water type from wells in the vicinity is sodium-magnesium sulfate.

OWNERSHIP AND USE OF LAND

Table BC-1 shows the ownership of surface and coal in the Bitter Creek tract. Approximately 3,280 acres belong to an energy-related landowner. Table BC-2

TABLE BC-1
OWNERSHIP OF SURFACE AND COAL IN THE BITTER CREEK TRACT

	Acreage of Surface Owned	Acreage of Coal Owned
Private landowners	3,835	120
State of Wyoming	640	640
United States	235	3,950

TABLE BC-2
SURFACE OWNERSHIP IN THE BITTER CREEK TRACT BY LANDOWNERS NOT RELATED TO ENERGY AND RELATIONSHIP TO TOTAL HOLDINGS IN THIS AREA

Owner Number	Acreage Owned in This tract	Acreage Owned over Federal Coal in This Tract	Percentage of This Owner's Holdings in This Area
1	755	1,680	45%
2	675	5,040	13%

shows the acreage owned by landowners that are not energy related and the relationship of each owner's holdings in the tract to that owner's total holdings in this area.

The BLM conducted a study in 1980 of owners of land overlying federal coal in the area. No surface owner at that time indicated a preference against mining.

The principal uses of the land are grazing and farming. Livestock grazing occurs on approximately 4,020 acres and crops are grown on 690 acres.

There are two occupied dwellings on the tract. One is on land controlled by an energy-related landowner.

The tract overlies portions of two known geological structures (KGSs). The northern third of the tract overlies the Sandbar West KGS, and the southwest corner overlies small portions of the Recluse KGS. MMS does not anticipate any conflicts with these KGSs.

AGRICULTURAL ECONOMICS

Data derived from the 1979 baseline in the Powder River input-output model indicate that estimated gross agricultural sales in Campbell County represent about 3% of the county's total estimated sales. Projections indicate that agricultural sales will slip to about 1% of the total by 1995. Two major sectors of the county's economy that exceed agricultural sales are mining, about 57% of the total, and construction, about 20%.

Agricultural productivity in Campbell County is somewhat lower than the average productivity in the United States, and total productivity in the county is insignificant to total production in the nation. The county's production of oats and wheat contribute about 5% and 7%, respectively, to Wyoming's total production of oats and wheat. The inventory of cattle in the county contributes about 5% to the state's total cattle inventory (see table BC-3).

The average of the monthly prices for all wheat in Wyoming, as listed in Wyoming Agricultural Statistics, 1981 (Wy. Crop and Lvst. Rptg. 1981), was \$3.22 per bushel in 1979. Because table BC-3 indicates that an average of 16.3 bushels of wheat were produced per acre of wheat in Campbell county, the average gross value of an acre of wheat would be \$52.49. In the same manner, the average gross value of an acre of oats would be \$51.45, with oats at \$1.47 per bushel; the average gross value of an acre of barley would be \$50.17, with barley at \$2.26 per bushel; and the average gross value of an acre of hay would be \$49.94, with hay at \$53.70 per ton. Table BC-4 indicates that the five-year (1975-1979) gross average monthly return to an animal unit was \$26.00 for cattle in Campbell County. Because it is estimated that the support of one animal unit for one month requires 5 acres, the average gross return per acre in the support of cattle equals \$5.20.

TABLE BC-3
CAMPBELL COUNTY'S 1979 AGRICULTURAL PRODUCTION AS COMPARED TO THAT OF WYOMING AND THE UNITED STATES[a]

	Yield (bushels per acre)	Total Production (thousands of bushels)
Barley		
Campbell County[b]	22.2	88.0
Wyoming[b]	60.0	8,700.0
United States[c]	50.6	378,067.0
Oats		
Campbell County[b]	35.0	122.5
Wyoming[b]	44.0	2,288.0
United States[c]	54.4	534,386.0
All Wheat		
Campbell County[b]	16.3	445.2
Wyoming[b]	22.1	6,354.0
United States[c]	34.2	2,141,732.0
All Hay	(tons per acre)	(thousands of tons)
Campbell County[b]	0.93	47.4
Wyoming[b]	1.77	2,127.0
United States[c]	2.39	145,878.0

Cattle Inventory on January 1, 1979	(1,000 head)
Campbell County[b]	72
Wyoming[b]	1,380
United States[c]	110,864

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a. Includes irrigated and nonirrigated crops.

b. Information from Wyoming Agricultural Statistics 1981 (Wyo. Crop & Lvst. Rptg. 1981).

c. Information from Agricultural Statistics 1980 (USDA 1980).

TABLE BC-4

GROSS RETURN FOR SUPPORTING AN ANIMAL UNIT (AU) IN INVENTORY FOR ONE MONTH IN CAMPBELL COUNTY

Five-Year Average (1975-1979)

		Cattle	Sheep	Mule Deer	White-tailed Deer	Antelope	Elk	Overall
Campbell County								
5-year cumulative inventory[a]	(AUs)	305,000	88,000	30,000	1,400	38,000	600	463,000
5-year cumulative returns[b]	($1,000)	93,400	12,100	6,300	90	8,300	-0-	120,000
Average annual return to an AU[c]	($)	306	138	210	64	218	-0-	259
Average monthly return to an AU[d]	($)	26	12	18	5	18	-0-	22

---

a. This is the sum of the beginning year inventories for the five-year period. Figures have been converted to animal units by standard BLM factors. For purposes of this study, animal unit equivalents are as follows:

1 800-pound cow with or without calf = 1 AU
1 bull = 1.2 AUS
1 heifer or steer heavier than 500 pounds = 0.7 AU
1 calf lighter than 500 pounds = not counted
5 sheep = 1 AU

4 mule deer = 1 AU
4.5 white-tailed deer = 1 AU
1.25 elk = 1 AU
5 antelope = 1 AU

Estimates of animal units in cattle and sheep are based on beginning year inventories by county as published in Wyoming Agricultural Statistics 1981 (Wyo. Crop and Lvst. Rptg. 1981). Estimates of animal units in wildlife are based on beginning year inventories that were converted from data furnished as the post-harvest populations of herd units for the five-year period between 1974 and 1978 by Wyoming Game and Fish Department.

b. For cattle or sheep, this represents the sum of gross receipts during the five-year period. Figures were derived from data published in the report cited in note "a." The value for sheep includes gross receipts for wool.

For wildlife, this is the sum of sportsman expenditures for the same period. Figures were derived from data furnished by Wyoming Game and Fish Department on a herd unit basis. The return to an AUM in wildlife should be viewed as the return to the economy in the state of Wyoming.

c. Returns divided by inventory.

d. Return to an animal unit (AU) divided by 12.

Table BC-5 indicates that sales of cattle and calves represent about 86% of total agricultural sales in Campbell County. Sales of sheep and lambs and sales of wheat are equal, with each representing about 5% of agricultural sales. Sales of other commodities are of relatively minor significance, each category being less than 2% of the total.

Table BC-6 presents an estimate of net return to an animal unit in inventory for small, intermediate, and large cattle enterprises in Campbell County. The net returns were obtained by applying the 1975-1979 average gross return (from table BC-4) to 1979 costs. It is particularly realistic that average returns from 1975 to 1979 are compared to 1979 production costs in view of the fact that cattle prices rise and fall in a cyclical pattern, while production costs maintain a constant upward trend. The resulting returns after operating costs are typical of the low returns to investment and management in present-day agriculture. It can be seen, in table BC-6, that the returns after operating costs quickly become negative when applied to investment and management.

WILDLIFE

The Bitter Creek tract and the surrounding area serve as yearlong habitat for antelope. The tract is part of the Gillette antelope herd unit. On the basis of 1981 post-hunting season population projections, the average density in the herd unit is 5.7 animals per square mile. Density in the tract area may be somewhat lower because of the abundance of ponderosa pine habitat on the hills.

There appears to be a large-scale movement of antelope from the tract area southward in the late fall. The animals tend to congregate in the area from Horse Creek south to just north of the Buckskin Mine.

The tract is yearlong habitat for mule deer. It is part of the Powder River mule deer herd unit. On the basis of 1981 post-hunting season population projections, the average density in the herd unit is 6.3 animals per square mile. The interspersion of ponderosa pine habitat, topographic cover, and the meadows along Bitter Creek and Armstrong Creek makes the tract good mule deer habitat.

A small portion of the southwest corner of the tract is potential nesting habitat for sharp-tailed grouse from the TR lek. The lek itself is approximately 1.5 miles from the tract boundary. Sharp-tailed grouse have been observed on the tract in the meadows along Bitter Creek.

Two golden eagle nests are known to exist on the tract. During land use planning, the BLM delineated a protective buffer zone around each nest. The buffer zones are shown on the tract map. The northern nest was active in 1980 but inactive in the 1981 nesting season. The southern nest was found in 1981 and was active, with two young in the nest.

The only other species of high federal interest on or near the tract is the burrowing owl. U.S. Fish and Wildlife Service personnel observed adult and juvenile owls in 1981 approximately 1/4 mile east of the tract boundary. No 1982 data are available concerning the presence or absence of these birds on the tract. There is a prairie dog town that covers several thousand acres

TABLE BC-5
ESTIMATES OF 1979 CASH RECEIPTS FOR MAJOR AGRICULTURAL COMMODITIES IN CAMPBELL COUNTY[a]
(rounded to the nearest $100,000)

Commodities	($1,000)
Cattle and calves[b]	29,200
Hogs[c]	100
Sheep and lambs[d]	1,700
Wool[e]	500
Dairy products[f]	100
Barley[g]	100
Corn[g]	--
Dry beans[g]	--
Hay[g]	400
Oats[g]	100
Sugar beets[g]	--
Wheat[g]	1,700
Total	33,900

a. Based on total cash receipts for each commodity in Wyoming for 1979, as reported in Wyoming Agricultural Statistics 1981 (Wyo. Crop & Lvst. Rptg. 1981). Does not include receipts for poultry and eggs or other miscellaneous commodities. Commodity categories presented represent 98.5% of total Wyoming receipts for 1979.

b. The disaggregation of total Wyoming cash receipts for cattle and calves was accomplished on the basis of the summation of the county's share of all cattle and calves, all cows that have calved, and cattle and calves moved on brand certificates by county of origin in 1979.

c. The disaggregation of total Wyoming cash receipts for hogs was accomplished on the basis of trends in the county's share of total hogs between 1972 and 1976.

d. The disaggregation of total Wyoming cash receipts for sheep and lambs was accomplished on the basis of the summation of the county's share of all stock sheep and all sheep and lambs moved on brand certificates by county of origin in 1979.

e. Total Wyoming cash receipts for wool were disaggregated on the basis of the county's share of stock sheep in 1979.

f. Total Wyoming cash receipts for dairy products were disaggregated on the basis of the county's share of milk cows in 1979.

g. Total Wyoming cash receipts for the various crops were disaggregated on the basis of the county's share of the crop's production in 1979.

TABLE BC-6
CAMPBELL COUNTY
ESTIMATED NET RETURN TO AN ANIMAL UNIT (AU) IN INVENTORY FOR SMALL, INTERMEDIATE, AND LARGE CATTLE ENTERPRISES[a]

	75 Cows 98 AUs[b]		400 Cows 519 AUs[c]		1,000 Cows 1,298 AUs[d]	
Gross return to inventory at $306.00 per AU[e]		$29,988		$158,814		$397,188
Less operating costs:						
BLM fee	$ 175		$ 930		$ 2,317	
Forest Service fee	213		1,162		2,939	
State lease	204		1,122		3,013	
Private lease	--		8,742		25,493	
Hay, produced	--		8,639		19,501	
Hay, purchased	4,644		9,615		21,697	
Protein supplement	5,094		23,698		76,924	
Salt and mineral	107		566		1,402	
Veterinary and medicine	301		1,998		3,595	
Hired trucking	127		991		3,621	
Marketing	237		16		4,231	
Fuel and lube	1,634		7,795		12,188	
Repairs	1,139		6,674		14,499	
Taxes	956		5,034		11,747	
Insurance	625		3,337		8,035	
Farm overhead	1,936		3,119		649	
Hired labor	608		6,067		20,132	
Interest on operating capital	1,217		5,896		13,992	
Total operating costs		19,217		95,401		245,975
Return after operating costs		$10,771		$ 63,413		$151,213
Less other costs:						
Family labor	2,761		7,712		8,216	
Depreciation	3,966		20,776		51,323	
Interest on land investment	21,054		106,644		264,364	
Interest on other investment	10,431		56,197		134,706	
Total other costs		38,212		191,329		458,609
Net return after all costs		-$27,441		-$127,916		-$307,396
Net return to an AU[f]		-$280.01		-$246.47		-$236.82

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a. This is a composite budget reflecting the general character of Campbell County. It is intended to represent an average budget for this size of operation in the county to the extent possible. It is based on the five-year (1975-1979) average return to an animal unit in inventory as applied to estimated 1979 expenses. The basic costs were derived from budgets that were developed by the Economic Research Service, USDA, for operations in the Thunder Basin National Grasslands.

b. Feed dependency: 7.7% BLM lease; 5.1% Forest Service lease; 7.8% state lease; 47.4% deeded acreage; 19% purchased hay; 7.5% protein supplement; 5.5% miscellaneous, including crop residue.

c. Feed dependency: 7.7% BLM lease; 5.1% Forest Service lease; 7.8% state lease; 12.1% private lease; 36.2% deeded acreage; 8.0% purchased hay; 11% produced hay; 6.6% protein supplement; 5.5% miscellaneous, including crop residue.

d. Feed dependency: 7.7% BLM lease; 5.1% Forest Service lease; 7.8% state lease; 14.6% private lease; 33.5% deeded acreage; 7.0% purchased hay; 10.0% produced hay; 8.8% protein supplement; 5.5% miscellaneous, including crop residue.

e. See table

f. Obtained by dividing "Net Return After All Costs" by the number of animal units in the inventory.

both on and off the tract, so there is abundant available habitat for this species.

The presence of the large prairie dog town also means there is suitable habitat for the black-footed ferret; however, much of the town along Bitter Creek has been heavily poisoned in the recent past. There have been no sightings of black-footed ferrets within 20 miles of the tract area in the past 20 years. All prairie dog towns on the tract would have to be thoroughly surveyed before mining could be initiated.

Bald eagles are rarely seen in the tract area; they are present in the Powder River Basin only during winter.

CULTURAL RESOURCES

A review of BLM records, State Historic Preservation Office files, General Land Office plats, and historical indexes reveals that there are five prehistoric sites in Sections 27 and 34, T57N, R74W. Three of these five sites already have been evaluated as ineligible for the National Register of Historic Places. Only site 48CA1422 (NWNWNWNWSW of Sec. 27) and site 48CA1324 (SWNWNE of Sec. 34) have not been evaluated. They must be evaluated for their National Register potential before any surface disturbance takes place, in case mitigative measures are necessary.

One of the earliest homestead entries in Campbell County occurred in Sections 22 and 23, T57N, R74W. The entry was filed in 1891, and the site could yield important information about area homesteading efforts. If any homestead remains are located, the BLM's "Guidelines for Evaluating Historical Sites in Wyoming" must be followed.

VISUAL RESOURCES

The landscape of the Bitter Creek tract is breaks and stream bottoms. Vegetation is largely sagebrush/grasslands with scattered areas of ponderosa pine. Stream bottoms are mostly in cropland.

The scenic quality is rated as Class B. Class B areas are areas in which there is a combination of some outstanding features and some that are fairly common to the physiographic region (USDI, BLM 1980).

The tract would not be visible from any major highway. This, when combined with medium sensitivity and the scenic quality class, results in a Visual Resource Management (VRM) Class IV. VRM Class IV allows for intrusions to be a dominant feature of the landscape in scale but repeat form, line, color, and texture of the existing landscape.

Intrusions on the Bitter Creek tract are roads, fences, and ranch structures.

NOISE

The existing noise sources in the tract are wind, agricultural activity, and traffic along county roads. The noise level is approximately 30 decibels (dB) (USDI, BLM 1979). This noise level is lower than normal conversation; it is rougly comparable to a whisper.

CLIMATE AND AIR QUALITY

Climatic information is available from Gillette, which is south of Bitter Creek tract. Gillette's minimum monthly average temperature is 21° F.; its maximum monthly average is 69° F. The average growing season is 111 days. Winds are predominantly from south-southeast to south-southwest (37%) and from north-northwest to north (21%). There is wind of more than 14.5 miles per hour about 23% of the time. The average annual rainfall is about 13 inches; average annual snowfall is about 65 inches.

There are no topographic restrictions to pollutant dispersion, but dispersion in this area frequently is hindered by such meteorological conditions as low mixing heights, low wind speeds, and no precipitation.

The region's air quality generally is very good. The background level of particulate (average geometric mean) is estimated to be about 15 micrograms per cubic meter (mcg/m^3). However, particulate levels increase near existing mines to levels approaching the Wyoming standard of 60 mcg/m^3. There is little monitoring of gaseous pollutants, but levels are estimated to be quite low.

The average monthly visibility at Sheridan ranges from 26 to 47 miles, with visibility of 60 miles or greater fairly common (PEDCo Env. Inc. 1981). The visibility exceeds 25 miles 75% of the time.

TRANSPORTATION FACILITIES

A graveled county road runs along Bitter Creek from the southeast to the northwest through the tract. U.S. Highway 14-16 lies approximately 25 miles south via the county road.

The nearest railroad is approximately 35 miles to the southeast.

EMPLOYMENT AND INCOME

Tables BC-7 and BC-8 present employment and income in Campbell County for the base year, 1980, with projections for 1985, 1990, and 1995. Trends and regional developments, most notably coal development, will cause total employment in the county to double by 1995; however, income will increase even faster because of the influence of higher wages in the coal mining sector.

COMMUNITY FACILITIES

Table BC-9 presents population, housing, community facilities, and local expenditures in Campbell County for the base year, 1979-1980, with projections for 1985, 1990, and 1995. A rapidly increasing population will require additional housing and community services. As the demand for community services rises, local expenditure levels will increase. The projections of community services and local expenditures are based on the local levels of services per 1,000 population and on per capita expenditure levels during the base period, so that the community standards of that period can be maintained in the projections.

TABLE BC-7
CAMPBELL COUNTY EMPLOYMENT IN 1980 WITH PROJECTIONS FOR FUTURE YEARS

	1980[a]	1985[b]	1990[b]	1995[b]
Coal mining	2,022	6,200	10,500	12,500
All other	11,384	10,800	14,000	14,100
Total	13,406	17,000	24,500	26,600

a. Total 1980 employment published by the Wyoming Employment Security Commission. Coal employment for 1980 is estimated by Casper District office, BLM. All other employment for 1980 is derived.

b. Projections are derived from the Casper District input-output model.

TABLE BC-8
CAMPBELL COUNTY ANNUAL INCOME FOR 1980 WITH PROJECTIONS FOR FUTURE YEARS
(in thousands of dollars[a])

	1980	1985	1990	1995
Coal mining	54,282	166,600	281,300	334,300
All other	200,471	182,500	247,300	245,600
Total	254,753	349,100	528,600	579,900

a. Based on the average weekly wages for the county in 1980, as published by the Wyoming Employment Security Commission.

TABLE BC-9

POPULATION, HOUSING, COMMUNITY FACILITIES, AND LOCAL EXPENDITURES FOR 1979-1980 IN CAMPBELL COUNTY WITH PROJECTIONS FOR FUTURE YEARS[a]

	Population[b]	Housing[b]	School Enrollment[e]	Water Capacity[e] (MGPD)[c]	Sewage Capacity[e] (MGPD)[c]	Law Enforcement[e] (sworn officers)	Firefighters[e] Fulltime	Firefighters[e] Volunteers	Hospital Beds[e]	Local Expenditures (in thousands of dollars)[d]
Campbell County										
1979-1980	24,367	9,505				25				$13,681.1
1985	32,500	12,700				33				19,200
1990	47,200	18,400				48				27,800
1995	50,200	19,600				52				29,600
Gillette										
1979-1980	12,134	4,857		3.6[f]	1.7[g]	31	5	22	31[h]	$10,122
1985	16,200	6,500		4.8	2.3	41	7	29	41	14,200
1990	23,500	9,400		7.0	3.3	60	10	43	60	20,700
1995	25,000	10,000		7.4	3.5	64	10	45	64	22,000
School District 1										
1979-1980			4,570							$35,855.2
1985			6,100							50,300
1990			8,900							73,000
1995			9,400							77,600

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a. All 1979-1980 figures are from the Wyoming Department of Economic Planning and Development except as noted.

b. Base year data are from the 1980 final census. Projections are based on 1980 population-to-employment ratios. Population projections for towns are based on the 1980 city-to-county ratio.

c. Million gallons per day.

d. Figures for 1979-1980 are actual expenditures as reported by local entities. Includes debt servicing. Projections are based on 1979-1980 per capita expenditure levels.

e. Projections are based on 1979-1980 levels per 1,000 population.

f. Completion of the Madison Project has now provided an additional 10.1 million gallons per day.

g. Construction of other sewage facilities is under study. If constructed, these facilities would have the capacity for an additional 7.4 million gallons per day.

h. Expanding to 60 beds.

It is assumed that revenues will equal expenditures through additional taxes, user fees, grants, royalties, or debt.

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

GEOLOGY AND TOPOGRAPHY

Of the 409 million tons of coal in place, about 41 million tons would not be recovered by surface mining. Approximately 368 million tons would be produced and used to meet the nation's energy demand.

The topography of the tract would be altered by mining and reclamation according to the following general formula:

> Overburden thickness times 1.3* minus overburden thickness plus coal thickness

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*The bulking factor (1.3) represents the amount of volume increase of the overburden when it is broken up after mining and an increase in void space occurs (USDI, BLM, BOR, & GS 1979).

When this formula is applied, figures indicate that the average elevation of the whole tract would increase by about 45 feet and the draws and hills would be replaced by a more uniform topography.

SOILS AND VEGETATION

Vegetation in the unit would be disturbed at the rate shown on page 10 of Part II. Replacement of topsoil, seedbed preparation, seed mixtures, and other aspects of reclamation would be determined by federal and state regulations. Dry weight production could be expected to exceed premining levels as early as five years after reclamation; however, species composition probably would differ from that of the original communities.

WATER RESOURCES

Surface Water

Surface water would be affected by surface mining primarily during the mining period, when existing drainage patterns in parts of the area would be displaced, runoff would be intercepted, and existing reservoirs would be removed from the mined area. Channels would have to be diverted around the mine pit to carry their natural flows. The channelization could decrease annual and low flow rates because of seepage loss to the pit. Peak flows could be increased by channelization.

Channelization of stream courses could cause increased flow velocities, and the release of production water, including mine drainage, could alter the flow characteristics of streams. Erosion and sedimentation might increase during construction and operation of the mine, after the removal of vegetation and before its reestablishment on reclaimed areas. The concentration of dissolved solids might increase in water downstream from the mine during mining, depending on the amount and concentration of water in the receiving streams.

Groundwater

Removal of the coal and overburden aquifers would destroy shallow wells on the tract and in the adjacent area. After mining and reclamation, the backfilled spoils could be expected to have a transmissivity of roughly one order of magnitude less than the original aquifer. Recharge into the backfilled spoils would be slow, and any water obtained from the spoils probably would be high in dissolved solids. Aquifers underlying The Wall coal bed would undergo little or no impact from mining.

OWNERSHIP AND USE OF LAND

A maximum of 1,286 acres would be removed from agricultural production at any one time in the 4,710-acre tract. This figure includes the 320 acres that would be occupied by mine facilities and the amount of land actually being mined at any given time, as well as the land that would be in the process of reclamation. A six-year reclamation period is assumed, after which the reclaimed land would be stabilized and available for its previous use. Full restoration of the land and its vegetation to the premining condition would require a longer time.

A rail spur right-of-way would require 735 acres, and relocation of the graveled county road would require 90 acres. Upgrading of the access road would require 50 acres. This estimate is based on expanding the existing roadbed to accommodate a paved surface handling approximately 380 vehicles per day. This would not be a major expansion because the existing graveled road is wide and well maintained.

The occupied dwellings would be destroyed or removed.

The 35 miles of rail spur would also disrupt land use patterns along the route. The exact impacts to individual landowners cannot be anticipated without a proposed route. These impacts would be specifically addressed in the mine plan environmental impact statement.

Rights-of-way for relocated and new power lines and pipelines would not remove any acreage from agricultural production except during construction. If substations or pumping stations were necessary, a small amount of additional land would be disturbed.

AGRICULTURAL ECONOMICS

In the event that all 481 acres that are to be disturbed annually on the Bitter Creek tract were devoted to any single crop (barley, oats, wheat, hay), the loss to annual production in the nation would not be measurable, and the loss to Wyoming would be less than 1%. If the acreage was devoted entirely to oats, development of the tract could cause about a 14% decline in the county's annual production of oats; however, at the 1979 average price in Wyoming of $1.47 per bushel, the effect on Campbell County's agricultural sales (in 1979 terms) would be negligible. The relative yields and production levels are shown under "Agricultural Economics" in the "Affected Environment" section.

Aside from unquantifiable changes in the quality of life and lifestyles, the development of this tract could prove beneficial to individuals who own surface on the tract. With annual royalty payments under regional lease agreements ranging from 2 cents to 35 cents per ton of coal, at an average of 78,141 tons per acre, an acre would yield about $1,560 at 2 cents per ton. That amount of royalty would be worth about 30 years of wheat production at $52.49 per acre of wheat. These figures do not take into account other types of compensation that often are included in lease agreements.

The potential for adverse effects on neighboring landowners must be acknowledged. Again, however, these effects are not quantifiable, and the development of coal is not entirely without benefit to neighboring landowners. Coal development provides job opportunities for individual agricultural operators, who increasingly find it necessary to rely on other sources of income to maintain their rural lifestyles. Another possible favorable effect is that severance taxes on coal probably serve to keep property taxes lower than they might be otherwise.

WILDLIFE

Mining of the tract would have little negative impact on pronghorn antelope. However, the railroad route used by the lessee of this tract could adversely affect the seasonal north-south movement to preferred winter range areas. The extent of the effect would depend on the location of the cuts and fills necessary to build the railroad and on how much of the railroad would be fenced with woven wire to make an antelope crossing barrier. Potential problems could be minimized with the use of fencing methods approved by the Wyoming Game and Fish Department for use in antelope range and with proper design of the railroad.

The general smoothing of hills along both sides of Bitter Creek would make the tract more suitable for antelope use after reclamation.

Mining of the tract would have negative effects on mule deer. The most severe effect would be the lowering of the long-term value of the tract as mule deer habitat. The rough topography could not be replaced during reclamation because of constraints written into federal and state strip mining regulations. The removal of ponderosa pine during mining could be mitigated by replanting of this species on reclaimed areas; however, the new trees would not be big enough to provide adequate escape for 15 years or more. It would take more than 30 years for the trees to grow to sufficient height to provide thermal cover.

Since the area surrounding the tract is now sparsely populated, the influx of people into the area probably would cause a manifold increase in poaching and road kill losses. Most mule deer currently using the tract would be displaced to adjacent undisturbed habitat, since there has been little large-scale habitat disruption in the general area.

Sharp-tailed grouse would suffer only minor negative impacts from mining the tract. Some of the area within the 2-mile radius of the lek is covered by ponderosa pine and thus not suitable for sharp-tailed grouse nesting. Unless a large lek is found on or near the tract later, the few grouse that may use the tract area would merely be displaced to adjacent undisturbed lands.

Impacts to the golden eagles nesting on the tract would be partially mitigated by the presence of the protective buffer zones around the nests. There is an abundance of alternative nesting sites off the tract for the pair using the northern nest. The southern pair would have few alternate sites off the tract. Mining would destroy the portion of the prairie dog town closest to each eagle nest. Overall impacts to this species would be slightly negative.

Burrowing owls would be affected adversely by direct destruction of potential nest burrows. The vibration and ground shock caused by blasting on the mine site could have an adverse effect on owls using burrows off the tract by causing the burrows to cave in. While there are numerous possibilities for alternate nesting sites farther from the tract, it would be necessary for the coal lessee to monitor these birds closely on and near the lease area.

Mining of the tract would destroy the portion of the prairie dog town that is on the tract. Because much of the town has been heavily poisoned in the recent past, it is not likely to be high value habitat now for black-footed ferrets. Because the town extends far beyond the tract, it would be necessary for the lessee to survey the entire town before mining activities could begin. Monitoring would be necessary throughout the life of the mining project to ensure that black-footed ferrets would not be affected by mining.

Mining should have no adverse effects on bald eagles.

CULTURAL RESOURCES

Before undertaking any activities that might disturb the surface of the leased lands, the lessee would have to have an archeologist and, where appropriate, a historian conduct an intensive field inventory for cultural resources on any areas that could be adversely affected by lease-related activities. The archeologist, who must be approved by the BLM, would submit a report of the inventory, with recommendations for protecting identified cultural resources, to the regional director of the Office of Surface Mining (OSM) and the authorized officer of the BLM. Additional clarification of procedures and requirements for protection of cultural resources can be found in lease stipulations or obtained from authorized officers of the OSM and the BLM.

VISUAL RESOURCES

Mine facilities, access structures, and communication and utility facilities would alter the form, line, color, and texture of the tract, as would the extraction of overburden and coal. Very large vertical structures would be the most disruptive. The rough terrain and the fact that the tract is not visible from a city or a major highway would reduce the impact of the intrusions.

The mined area would revert to VRM Class V during mining and until reclamation measures returned the landscape character to Class IV. Class V areas are areas that require reclamation or rehabilitation to restore natural landscape character.

Natural character in areas of steep and rough terrain west of Bitter Creek and north of Armstrong Prong would not be completely restored by reclamation. Some vegetative communities would not be fully developed for 20 to 30 years. Irreversible and irretrievable impacts would result from permanent roads, power lines, and structures and from any urban growth caused by increased population.

NOISE

Noise in zones of the affected environment would extend to the 50 dB contour, according to methods described in Planning in the Noise Environment (US, Departments of Air Force, Army, and Navy n.d.). The 50 dB level is equivalent to the noise level in a typical office. These zones of increased noise would extend for about 1/3 mile around the tract, for 1,000 feet on either side of the centerline of the railroad spur, and for 100 to 200 feet on either side of the centerline of the access road.

Impacts within the increased noise zones would include damage to health and hearing; interference with speech, work tasks, and sleep; effects on inter-room privacy; and general annoyance (Rau and Wooten 1980). Effects on animals would be restlessness, confusion, and interference with routines. Nevertheless, the overall impact would be low because the land uses within the affected zones are rated as insensitive to noise (Rau and Wooten 1980).

CLIMATE AND AIR QUALITY

A report prepared by PEDCo Environmental, Inc. (1983) indicates that development of the Bitter Creek tract could cause the 24-hour level of total suspended particulates to reach 145 micrograms per cubic meter in 1990, 209 in 1995, and 229 during the life of the mine. The 1995 and mine life levels would exceed the Wyoming 24-hour standard and the secondary national ambient air quality standard.

TRANSPORTATION FACILITIES

Approximately 25 miles of graveled county road would require upgrading to accommodate the estimated 380 vehicles per day that would travel to and from the mine. This upgrading would include widening, paving, and bridge construction. Approximately 4 miles of county road that crosses the tract would be relocated or closed.

Approximately 35 miles of new rail spur would be required to serve the six trains per day to the mine. This number includes incoming empty and outgoing loaded trains. This 35 miles would require a substantial amount of land for construction (see the "Ownership and Use of Land" section).

EMPLOYMENT AND INCOME

Table BC-10 presents the changes to employment and income that would occur in Campbell County as a result of coal development on the Bitter Creek tract. The change in total income in the county may be greater than the change in employment. There are two factors that may cause this: first, as was observed under employment and income in the section on the affected environment, is the influence of higher wages paid in the coal sector;

TABLE BC-10
INCREASES IN CAMPBELL COUNTY EMPLOYMENT AND ANNUAL INCOME DUE TO THE BITTER CREEK TRACT

Employment	1985	1990	1995
Coal mining[a]	--	500	500
All other[b]	--	110	110
Total		610	610

Annual Income (in 1980 dollars)[c]	1985	1990	1995
Coal mining	--	$13,400,000	$13,400,000
All other	--	1,900,000	1,900,000
Total		$15,300,000	$15,300,000

a. Derived from the Casper District input-output model.

b. Reflects the county's share of 1 additional job for each additional job in coal mining, as determined by the ratio of the 1970-1981 change in Campbell County employment to the 1970-1981 change in regional employment.

c. Based on the average weekly wages, as published by the Wyoming Employment Security Commission for Campbell County in 1980.

second is the upward pressure on all wages as the demand for coal labor increases.

COMMUNITY FACILITIES

The changes in Campbell County population and the change in housing, community services, and local expenditure requirements that would result from the development of the Bitter Creek tract are shown in table BC-11. The table also contains an estimate of the revenues that would result from Bitter Creek. The estimate of net revenues shown is the difference between expenditures and revenues. Emphasis should not be placed on the magnitude of the net balance; the figure should serve only to indicate the potential for revenues to exceed expenditures, or vice versa.

TABLE BC-11
CHANGES IN POPULATION, HOUSING, COMMUNITY FACILITIES, AND LOCAL EXPENDITURES REQUIRED BECAUSE OF THE BITTER CREEK TRACT

	Year	Campbell County	Gillette	School District 1
Population[a]	1985	--	--	
	1990	+ 1,180	+ 590	
	1995	+ 1,180	+ 590	
Housing[b]	1985	--	--	
	1990	+ 460	+ 240	
	1995	+ 460	+ 240	
School enrollment[c]	1985			--
	1990			+ 220
	1995			+ 220
Water capacity[c] (MGPD)[d]	1985		--	
	1990		+ 0.2	
	1995		+ 0.2	
Sewage capacity[c] (MGPD)[d]	1985		--	
	1990		0.1	
	1995		0.1	
Law enforcement[c] (sworn officers)	1985	--	--	
	1990	+ 1	+ 2	
	1995	+ 1	+ 2	
Fulltime firefighters[c]	1985		--	
	1990		--	
	1995		--	
Volunteer firefighters[c]	1985		--	
	1990		+ 1	
	1995		+ 1	
Hospital beds[c]	1985		--	
	1990		+ 2	
	1995		+ 2	
Local expenditures[e] ($1,000)	1985	--	--	--
	1990	+ 700	+ 500	+ 1,800
	1995	+ 700	+ 500	+ 1,800
Local revenues[f] ($1,000)	1985	--	--	--
	1990	+ 2,200	+ 300	+ 3,900
	1995	+ 2,200	+ 300	+ 3,900
Net revenues[g] ($1,000)	1985	--	--	--
	1990	+ 1,500	- 200	+ 2,100
	1995	+ 1,500	- 200	+ 2,100

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a. County population is based on the 1980 population-to-employment ratio of 1.923 to 1. City population is based on the 1980 city population-to-county population ratio of 0.4980 to 1.

b. County housing is based on the 1980 ratio of 2.564 persons per house. City housing is based on the 1980 ratio of 2.498 persons per house.

c. Based on 1979-1980 levels per 1,000 population.

d. Million gallons per day.

e. Based on 1979-1980 per capita expenditure levels. Includes debt servicing.

f. Based on revenue relationships from the Powder River FEIS run of the coal revenue model.

g. Local revenues minus local expenditures.

NET ENERGY ANALYSIS

A net energy analysis calculated by the BLM indicates that 1 pound of coal from this tract would produce about 7,710 British thermal units (BTUs). An average of 37.7 BTUs would be used to produce 1 pound of coal. Therefore, the ratio of energy produced to energy expended would be 204.5 to 1 for the Bitter Creek tract.

APPENDIX

SUMMARY OF RESOURCE AND ENVIRONMENTAL CONSIDERATIONS
BITTER CREEK COAL LEASING TRACT

Element	Present Situation	Anticipated Effect of Leasing and Development	Significance of Anticipated Effect	Data Reliability	Comments
GEOLOGY AND TOPOGRAPHY					
Paleontology	Fossil leaves and invertebrates common. Fossil vertebrates rare.	Destruction of some fossil-bearing strata; exposure of some fossil-bearing strata that would not have been exposed.	Low	Good	
Topography	Rugged hills; wide gentle valley in center of tract.	Elevation would be increased about 45 feet. Topography would be more uniform.	High	Poor	
SOILS AND RECLAMATION					
Soil erosion potential*	Moderate (Mont. Ag. Exp. Sta. 1982) Little or no structural development; very little accumulation of organic matter, so reconstructed soils can easily equal or exceed premining levels of dry matter production.	None (see "Comments" column)	None (see "Comments" column)	Low (data from General Soil Map)	Compliance with existing laws would reduce the impact to an insignificant level.

* Erosion potential = the susceptibility of a soil to erosion when no cover is present. Low: potential erosion is not sufficient to reduce productivity. Moderate: potential erosion is sufficient to reduce productivity but not to the point of entirely restricting production. High: potential erosion would cause a reduction in productivity to practically zero.

Element	Present Situation	Anticipated Effect of Leasing and Development	Significance of Anticipated Effect	Data Reliability	Comments
VEGETATION					
Vegetation	1,400 acres open sagebrush shrub/herbaceous; 1,600 acres open upland herbaceous/upland mixed shrub; 745 acres open juniper/upland mixed shrub; 30 acres open herbaceous/scattered riparian deciduous trees.	Vegetation would be destroyed at the rates specified on page 10 of Part II.	Loss of wildlife and livestock habitat would reduce the carrying capacity. There would be ecological differences between premining and postmining communities.	Fair	
Threatened and endangered plants	None			Good	

Element	Present Situation	Anticipated Effect of Leasing and Development	Significance of Anticipated Effect	Data Reliability	Comments
WATER RESOURCES					
Surface Water					
Occurrence	No perennial streams				
Quantity	Bitter Creek mean annual flow, 4.20 cubic feet per second, 10-year peak flow, 1,833 cfs.	Little change after reclamation		Good	Estimated
Dissolved solids	More than 1,000 milligrams per liter	Little change after reclamation		Fair	Extrapolated from regional data
Major cations	Ca, Mg, Na	Little change after reclamation		Good	Extrapolated from regional data
Major anions	SO_4	Little change after reclamation		Good	Extrapolated from regional data
Importance for homes or towns	Nil				
Importance for industry	Nil				
Importance for livestock and wildlife	Major use	Partial loss of supply during mining			
Importance for Agriculture	Probable alluvial valley floor	Loss of essential hydrologic properties	Major	Good	
Groundwater					
Occurrence	Fort Union Formation	Destruction of shallow wells	Moderate	Good	
Quantity	Typical yield 2 gallons per minute			Poor	Estimated
Dissolved solids	More than 2,000 milligrams per liter			Fair	Extrapolated from regional data
Major cations	Na, Mg			Fair	Extrapolated from regional data
Major anions	SO_4			Fair	Extrapolated from regional data

Element	Present Situation	Anticipated Effect of Leasing and Development	Significance of Anticipated Effect	Data Reliability	Comments
WATER RESOURCES (Groundwater, continued)					
Importance for homes or towns	Small				
Importance for industry	Small				
Importance for livestock and wildlife	Moderate	Loss of shallow wells			
Importance for agriculture	Small				
OWNERSHIP AND USE OF LAND					
Agricultural production	Livestock grazing, 4,020 acres; crops, 690 acres	Maximum of 1,286 acres would be removed from production at any one time.		Good	
Occupied Dwellings	Two on tract; one on land of energy-related owner	Dwellings would be destroyed or removed		Good	Landowners have consented to mining.

AGRICULTURAL ECONOMICS

Affected Community	Affected Element	1979 ($1,000)	Anticipated Effect of Action ($1,000)	Assumptions	Significance Of Effect
Campbell County	Annual Agricultural receipts	33,900	-3	Assumes that all 481 acres to be disturbed annually would be devoted to the support of cattle.	Low
			-24	Assumes that all 481 acres to be disturbed annually is devoted to barley.	Low
			-25	Assumes that all 481 acres to be disturbed annually is devoted to oats.	Low
			-25	Assumes that all 481 acres to be disturbed annually is devoted to wheat.	Low
			-24	Assumes that all 481 acres to be disturbed annually is devoted to hay; rest of acreage disturbed devoted to cattle.	Low

Element	Present Situation	Anticipated Effect of Leasing and Development	Significance of Anticipated Effect	Data Reliability	Comments
WILDLIFE					
Big game					
Antelope	Tract is yearlong habitat, but most animals move south out of trsct area in winter.	Displacement of individuals. Tract would be more suitable for antelope after reclamation.	Low	Good	
		Railroad to tract could seriously impede antelope seasonal movement.	Moderate	Fair	The exact route the railroad would take is not known.
Mule deer	Common on tract area. Good mix of cover and feeding areas.	Smoothing of topography and long reestablishment time for ponderosa pine would lower the local. population.	Low	Good	
Small game					
Cottontail	Common in areas of rough topography and tall brush.	Smoother topography after mining would lower population levels.	Low	Fair	
Furbearers	Low density	Loss of prey base and habitat.	Low	Fair	
Nongame mammals	Moderate species diversity	Loss of individuals on site. Early recolonization of reclaimed areas by some species.	Low	Good	
Fish	No fish habitat present	None		Good	
Reptiles and Amphibians	Low species diversity	Loss of individuals on site	Low	Good	
Game Birds					
Sharp-tailed grouse	A small portion of the tract is within 2 miles of a lek and thus is potential nesting habitat.	Minor loss of nesting habitat	Low	Fair	

Element	Present Situation	Anticipated Effect of Leasing and Development	Significance of Anticipated Effect	Data Reliability	Comments
WILDLIFE (continued)					
Songbirds	Moderate species diversity	Loss of microhabitats and long reestablishment time for plants would result in lower species diversity after mining.	Low	Good	
Raptors					
Burrowing owl	One nest burrow within 1/4 mile of tract. Large prairie dog town in area provides abundant nesting habitat.	Ground shock from blasting could cause collapse of nest burrows. Owls could move onto the tract and be killed by earthmoving activities. Much of owls' hunting territory would be lost.	Moderate	Good	Lessee would have to monitor tract.
Golden eagles	Two nests on tract; one was active in 1980, inactive in 1981; other was active in 1981.	Topography and trees cover within buffer zones should be sufficient to prevent undue disturbance during nesting. Loss of prey base.	Low	Good	No data available on use of either nest in 1982.
Endangered Species	A large prairie dog town covers nearly 40% of the tract. No ferrets have been sighted in this area. Much of the town has been heavily poisoned.	Loss of potential ferret habitat and prey for large raptors.	Low	Fair	The entire town on and off the tract would have to be surveyed for presence of black-footed ferrets before mining could begin.
CULTURAL RESOURCES					
Cultural sites	Five prehistoric sites were discovered by Metcalf-Zier in 1981.	Destruction of all sites within the tract	Loss of resources	Poor because it is incomplete	Class III inventory will be required for areas not already intensively surveyed. Sites now known and not yet evaluated for eligibility, and any identified in the future, will have to be evaluated for eligibility for National Register of Historic Places, for potential impacts, and to identify appropriate mitigation of impacts.

Element	Present Situation	Anticipated Effect of Leasing and Development	Significance of Anticipated Effect	Data Reliability	Comments
VISUAL RESOURCES					
Visual resources	Area is rated Class IV.	Classification would change to V during life of mine.	High	Good	Landscape character would be permanently changed. Reclaimed area would be smoother and gentler than present landscape.
NOISE					
Noise sources and levels	Sources are wind, agricultural activity, and vehicle traffic. Estimated noise level is 30 dB.	Substantial increase in noise due to blasting, equipment, and more vehicle and railroad traffic. Zones of increase to 50 dB for 1/3 mile around tract, 1,000 feet from railroad centerline, and for 100 to 200 feet from access road centerline.	Insignificant	Acceptable	There are no land uses in affected zones that are sensitive to high noise levels.
AIR QUALITY					
Air quality	Concentration of particulates estimated at 15 mcg/m^3 (Wyo. standard is 60 mcg/m^3.)	Potential violation of federal secondary and Wyo. 24-hour standards in 1995 and during life of mine.	Moderate	Good	
TRASPORTATION FACILITIES					
Roads	County road runs through tract; U.S. 14-16 is 25 miles south	Relocating county road would take 90 acres; upgrading access road 50 acres.	Moderate	Good	Landowners outside tract would be affected.
Railroad	Nearest railroad is 35 miles southeast of tract	Rail spur 35 miles long would require 735 acres. Exact route not known.	High	Good	Land use patterns outside tract would be disrupted.

EMPLOYMENT AND POPULATION

Element	Affected Community	Situation in 1980	Trend to 1985	Effect of Action in 1985	Trend to 1990	Effect of Action in 1990	Trend to 1995	Effect of Action in 1995	Significance of Effect	Data Reliability
Employment	Campbell County	13,406	17,000	--	24,500	610 more jobs	26,600	610 more jobs	Low: would add 2.5% to 1990 employment.	Good
Population	Gillette	12,134	16,200	--	23,500	590 more persons	25,000	590 more persons	Low: would add 2.5% to Gillette's 1990 population.	Good

UNSUITABILITY CRITERIA RESULTS

State of Wyoming, T57N, R 73 and 74W

Criterion	Applicable to Tract?	Exceptions Used	Additional Data Needed	Comments
1. Federal land systems	No			
2. Rights-of-way and easements	No			
3. Buffer zones for roads, buildings, etc.	No			
4. Wilderness study areas	No			
5. Scenic areas	No			
6. Land used for scientific study	No			
7. Historic lands and sites	No			Eligibility for National Register of Historic Places has not been formally determined for any of the known sites by the National Register.
8. Natural areas	No			
9. Federally listed endangered species	Yes		Yes	Prairie dog town would have to be surveyed for black-footed ferrets before mining.
10. State listed endangered species	No			
11. Eagle nests	Yes	None	Yes	One nest inactive, one active in 1981. No data available for 1982. Nests will be checked in 1983.
12. Eagle roosts and concentration areas	No			
13. Falcon cliff nesting sites	No			
14. Migratory birds	Yes	None		Golden eagle nest. See Criterion II. Burrowing owls near tract.
15. State high-interest fish & wildlife	Yes	Yes		Burrowing owls near tract.
16. Floodplains	No			
17. Municipal watersheds	No			
18. National Resource Waters	No			
19. Alluvial valley floors	Possibly	None	Yes	Office of Surface Mining has been asked to evaluate
20. State proposed criteria	No			

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UNITED STATES DEPARTMENT OF THE INTERIOR

MINERALS MANAGEMENT SERVICE

PART II

1984 Lease Sale - Coal

SUMMARY REPORT - BITTER CREEK TRACT

Recluse Review Area - North

Campbell County, Wyoming

REVISION 3 - January 25, 1983

December 3, 1982

North Central Region

Casper District, Wyoming

TRACT SUMMARY REPORT

Minerals Management Service, North Central Region
Casper District, Wyoming

Date: Dec. 3, 1982

TRACT DESCRIPTION

Tract Name: Bitter Creek No.:

Coal Region: Powder River Basin

State: Wyoming County: Campbell

BLM Resource Area and Planning Unit: Buffalo Resource Area, Campbell County Planning Unit

USGS Quadrangle Map(s): Dead Horse Lake, Corral Creek, Homestead Draw SW, Reservoir Creek 7.5-minute series

Legal Description by BLM: See Attachment A [page 15]

Known Recoverable Coal Resource Area (KRCRA): Powder River Basin

Tract Acres by BLM; Approximate Acres by MMS (in parentheses)*:
Federal Uncommitted: ; (4156)
Federal Committed: ; (0)
State: ; (640)
Private (Fee): ; (100)
Total Tract: ; (4896)

Approximate Acres Underlain by Mineable Coal*:
Federal Uncommitted: 4101 acres
Federal Committed: 0
State: 640 acres
Private (Fee): 60 acres
Total Tract: 4801 acres

Estimated In-Place Coal (in Million Short Tons):
Federal Uncommitted: 339.1 MMT
Federal Committed: 0
State: 56.3 MMT
Private (Fee): 13.8 MMT
Total Tract: 409.1 MMT

(Calculated for coal beds 5 feet thick and greater to a depth of 300 feet.)

*Approximate acres based only on projected survey of 7.5-minute quadrangles. Actual acres are less.

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Revised January 25, 1983

Estimated Recoverable Coal (in Million Short Tons):
Federal Uncommitted: 305.2 MMT
Federal Committed: 0
State: 50.6 MMT
Private (Fee): 12.4 MMT
Total Tract: 368.2 MMT

(Estimated recoverable coal represents ninety percent of estimated in-place coal.)

ENTITIES EXPRESSING INTEREST

Wesco Resources, Inc.
P.O. Box 1181
1500 Poly Dr., Suite 250
Billings, Montana 59103

POTENTIAL FOR DEVELOPMENT OF TOTAL TRACT

EVALUATION FACTORS	CLASS 1	CLASS 2	CLASS 3
Coal "Resources" (Confidence in data)		X	
Coal Quality			X
Transportation			X
Mineability			X
Marketability			X
Overall Class			X

Class 1: Good potential
Class 2: Moderate potential
Class 3: Poor potential

The class for each evaluation factor was determined as follows:

COAL "RESOURCES" (Confidence in data) -

Class 1: Good
Confidence in quantity estimates is good because the surface areas of category "A" and "B" coals cover two-thirds or more of the total surface area of the tract.

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Class 2: Moderate
Confidence in quantity estimates is moderate because the surface ~~of~~ areas of category "A" and "B" coals cover one-third to two-thirds of the total surface area of the tract.

Class 3: Poor
Confidence in quantity estimates is poor because the surface areas of category "A" and "B" coals cover one-third or less of the total surface area of the tract.

COAL QUALITY - The coal quality of the Bitter Creek Tract is much lower than that of the general area. The largest detractor is the BTU/lb value which is 600 BTU/lb. below that of the general area. Because of this, the coal is classified as Lignite A. This classification is lower than the subbituminous C coal which is being mined in the Powder River Basin at this time. --- Class 3 determination.

TRANSPORTATION - The Bitter Creek Tract is located 7 to 8 miles south of the Wyoming/Montana border. Other than basic exploration, there has not been any mining activity or any mining interests in the form of leases or applications in the area. This tract is virtually isolated from any mining operations. Consequently, transportation systems in the form of railroads or improved roadways are non-existent. All the mines in the Powder River Basin utilize the railroad for shipment and should the developers of this tract decide to do likewise, about 35 miles of railroad would have to be constructed to tie in to the main line to the east. An initial capital outlay for this enormous amount of track would certainly be cost prohibitive. --- Class 3 determination.

MINEABILITY - The average ratio for the total tract is 4.98 cubic yards of in-place overburden per ton of recoverable coal. This is much worse than the average ratio of 1.98 cubic yards per ton for the mines in the Powder River Basin. Also, there are two areas classified as eagle-nesting sites which lie within the tract boundaries. The coal in these areas has been included in the "Federal Uncommitted" totals, but the possibility of a lessee not being allowed to mine these areas still exists. These eagle-nesting sites encompass about 650 acres and contain 46.54 million tons of in-place coal. --- Class 3 determination.

MARKET POTENTIAL - Only one expression of interest was received for this area. This tract does have some potential as outlined in the "Marketability" section on page 10 but when considered in conjunction with the previously-evaluated factors, this is a Class 3 determination.

OVERALL CLASS - The low coal quality, high stripping ratios, and poor transportation links are the primary detractors for this tract. The transportation factor alone would offset any of the other factors even if they had been rated higher. --- Class 3 determination.

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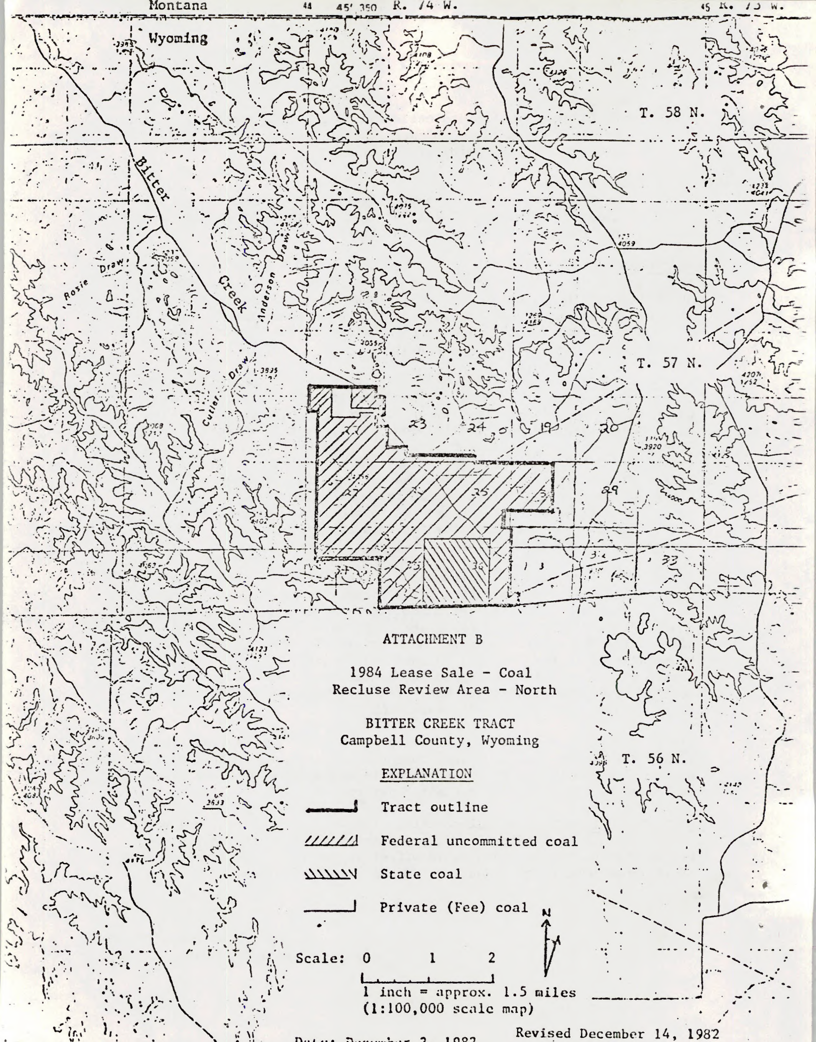

ATTACHMENT B

1984 Lease Sale - Coal
Recluse Review Area - North

BITTER CREEK TRACT
Campbell County, Wyoming

EXPLANATION

Tract outline

Federal uncommitted coal

State coal

Private (Fee) coal

Scale: 0 1 2
1 inch = approx. 1.5 miles
(1:100,000 scale map)

Date: December 3, 1982

Revised December 14, 1982

See Attachment B (Tract location map.)

POTENTIAL FOR DEVELOPMENT OF BITTER CREEK TRACT

IN-PLACE COAL - FEDERAL UNCOMMITTED

Coal Bed	Average Thickness	In-Place Coal (million short tons)		
		Category A	Category B	Category C
Anderson	21.5 feet		21.60	
Upper Canyon	13.5 feet		42.02	
Lower Canyon	9.6 feet		45.98	
Cook	26.0 feet		128.02	
Wall	26.9 feet		101.47	
Total			339.09	

IN-PLACE COAL - STATE

Coal Bed	Average Thickness	In-Place Coal (million short tons)		
		Category A	Category B	Category C
Anderson	22.0 feet		1.77	
Upper Canyon	11.7 feet		7.91	
Lower Canyon	8.1 feet		9.26	
Cook	25.1 feet		23.34	
Wall	22.9 feet		13.98	
Total			56.26	

(All coal quantities were calculated using the accepted unit weight of 1750 tons per acre-foot for lignite A coal.)

(No Federal committed coal occurs within the Bitter Creek Tract.)

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Revised January 25, 1983

IN-PLACE COAL - PRIVATE (FEE)

Coal Bed	Average Thickness	In-Place Coal (million short tons)		
		Category A	Category B	Category C
Anderson	---		---	
Upper Canyon	---		---	
Lower Canyon	8.7 feet		0.73	
Cook	27.6 feet		6.97	
Wall	26.3 feet		6.08	
Total			13.78	

IN-PLACE COAL - TOTAL TRACT

Coal Bed	Average Thickness	In-Place Coal (million short tons)		
		Category A	Category B	Category C
Anderson	21.5 feet		23.37	
Upper Canyon	13.3 feet		49.93	
Lower Canyon	9.4 feet		55.97	
Cook	25.9 feet		158.33	
Wall	26.5 feet		121.53	
Total			409.13	

(All coal quantities were calculated using the accepted unit weight of 1750 tons per acre-foot for lignite A coal.)

(No Federal committed coal occurs within the Bitter Creek Tract.)

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Revised January 25, 1983

COAL CATEGORY DEFINITIONS

CATEGORY "A" COAL

Coal quantity is estimated from data sources that are adequately spaced to assume, with a high degree of confidence, continuity between data points. The geologic character of the area is well defined.

CATEGORY "B" COAL

Coal quantity is based on an assumption of continuity between data points with a lower confidence level than that of category "A" coal. The geologic character of the area is not as well defined as category "A" coal.

CATEGORY "C" COAL

Coal quantity is based on an assumption of what can reasonably be expected to exist in the same producing region under analogous geologic conditions with a lower confidence level than that of either category "A" or "B".

RANGE OF COAL THICKNESSES

The following coal beds are listed in descending order:

Anderson	Min.	20 feet	Max.	22 feet
Upper Canyon	Min.	5 feet	Max.	21 feet
Lower Canyon	Min.	7 feet	Max.	13 feet
Cook	Min.	20 feet	Max.	36 feet
Wall	Min.	23 feet	Max.	26 feet

(Average thicknesses are listed in the charts on pages five and six.)

RANGE OF OVERBURDEN/INTERBURDEN THICKNESSES

The following coal beds are listed in descending order:

Anderson	Min.	0 feet	Max.	120 feet	overburden
Upper Canyon	Min.	140 feet	Max.	160 feet	interburden
Lower Canyon	Min.	35 feet	Max.	100 feet	interburden
Cook	Min.	75 feet	Max.	175 feet	interburden
Wall	Min.	40 feet	Max.	100 feet	interburden

(Coal quantity calculated to a depth of 300 feet.)

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COAL GEOLOGY OF THE BITTER CREEK TRACT

The five coal beds which are mineable by surface methods are contained in the Fort Union Formation (Paleocene) and are the Anderson and Upper Canyon coal beds which occur in the south and west part of the tract, the Lower Canyon coal bed which crops out along Bitter Creek, and the Cook and Wall coal beds which occur throughout the tract. The coal beds dip toward the northwest at about 20 to 80 feet per mile and are burned locally along the outcrops. A fault system bisects the tract along an east-west line.

The northern third of the tract overlies the Sandbar West Known Geologic Structure (KGS), and the southwest corner of the tract borders and overlies in a very small area the Recluse KGS. However, Minerals Management Service does not anticipate conflicts between oil and gas and coal production and believes that any potential conflicts can be mitigated. (See Attachment E for location of KCSs.)

No known or potential geologic hazards occur within the tract.

Revised December 14, 1982

COAL QUALITY

Coal Bed	Number of Samples	Moisture (%)	Volatile Matter (%)	Fixed Carbon (%)	Ash (%)	Sulfur (%)	BTU/LB.
Anderson	2	32.8	29.3	30.5	7.4	0.8	7600
Upper Canyon	3	33.3	28.7	31.7	6.4	0.4	7555
Lower Canyon	3	33.3	28.7	31.7	6.4	0.4	7555
Cook	2	32.4	28.4	33.7	5.6	0.4	7765
Wall	2	32.6	28.7	32.6	6.2	0.3	7785
Tract Average		32.7	28.6	32.7	6.1	0.4	7710
General Area		29.01	31.43	33.89	5.67	0.36	8339

(Data from one sample of those used for the Anderson, Upper Canyon, Lower Canyon, and Wall coal beds were taken from a drill hole located 2-1/2 miles south of the tract. The remainder of the data was taken from drill holes located either inside or within one mile of the tract.)

(The tract average is a tonnage-weighted average.)

Rank of coal: lignite A
Minor and trace elements: no data
Coking properties: no data

The coal quality for both the Federal uncommitted and total tract lands are virtually the same except for one minor difference. The moisture of the tract average for the total tract is 33.6% as opposed to 32.7% as listed above.

POTENTIAL USE OF COAL: Steam for generation of electrical power

TRANSPORTATION

	MODE	DISTANCE TO TRANSPORTATION LINK
Existing		
Being Developed		
Being Planned		
None Planned	Railroad	Approximately 35 miles

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Revised January 25, 1983

MINEABILITY

Type of Mine: Surface mine (truck and shovel)
Ratio of Federal Uncommitted: 4.98 to 1 (cubic yards of overburden per ton of recoverable coal)
Ratio of Total Tract: 4.98 to 1 (cubic yards of overburden per ton of recoverable coal)

Estimated Recovery:
Based on current practices in the Powder River Basin coal region, a recovery factor of 90 percent is typical. However, the coal quantities for this tract are designated as Class 2, and the estimated recovery may or may not be achieved.

Estimated Annual Production:
Federal Uncommitted: 10.2 million tons per year
Total Tract: 12.3 million tons per year

Estimated Mine Life: 30 years

Estimated Surface Acres to be Mined Per Year:
Federal Uncommitted: 137 acres per year
Total Tract: 160 acres per year

Active, Inactive, and Abandoned Mines or Leases in Tract Vicinity:
Active Mines: None
Inactive Mines: None
Abandoned Mines: None
Leases, Expired Leases, PRLA's: None

MARKETABILITY

One company has expressed interest and if a good market could be found for this lower quality coal, an operation might be viable. It is doubtful, though, that this lignite could compete directly with the subbituminous C coal currently being produced elsewhere in the Powder River Basin of Wyoming; but this picture may change as those mines advance to the deeper coals west of their current operations. It might be possible for a shallower mine with lower quality coal to be competitive at that time.

DEFINITIONS AND ASSUMPTIONS FOR THE BITTER CREEK TRACT: See Attachment C

REFERENCES: See Attachment D

Revised December 23, 1982
Revised January 25, 1983

ATTACHMENT C

DEFINITIONS AND ASSUMPTIONS FOR THE BITTER CREEK TRACT

1. The present mining operations in the area and the present state-of-the-art techniques were used to develop this tract.

2. The minimum bed thickness used was five feet.

3. As a general rule, a maximum overburden depth of 300 feet was used as the guideline for calculating the in-place coal tonnages. This is somewhat greater than what is presently occurring in the general area, but it is felt that reaching such a limit is not very far into the future and that it may be applied by the time this tract would be ready for mining.

4. An instructional memorandum from Reston, Virginia, dated March 17, 1982, specified that recovery factors of 90 percent for surface mines and 50 percent for underground mines were to be applied to the coal quantity.

5. In determining the number of miles of rail spur, it was assumed that the best location was available. The route was then measured on a map.

6. "Surface-Mined Acres" are those acres which are underlain by coal. Other acres not underlain by coal but within the tract boundaries were not counted as being disturbed, except where an area for facilities was provided.

7. "Total Tract" means a tract of coal of various ownerships (Federal, State, private, etc.) which can be mined in a logical manner. For example, a total tract could contain State coal, currently-leased Federal coal, and Federal uncommitted coal. This is used only for studying the impacts of a mining venture.

8. "Federal Uncommitted" refers only to that coal within the total tract which will be offered for sale.

9. "Mine Life" means the number of years that a mine is producing coal. It does not include time for construction of facilities, reclamation work, etc. The mine life is assumed to be 30 years for this tract.

10. "Annual Production" is simply the total recoverable coal quantity divided by the mine life. It is an average figure used solely for general estimation purposes and does not reflect any build-up or slow-down of production, nor does it represent the design maximum production potential of the mine. The average for the general area is about 12.5 million tons per year.

11. "Mineable Coal" is considered identical to the "In-Place Coal". The recovery factor was applied to the "Mineable Coal".

Revised December 14, 1982

ATTACHMENT D

REFERENCES

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U.S. Geological Survey, 1981, Geophysical logs of 92 coal drill holes and 3 water wells in Campbell and Sheridan Counties, Wyoming: Technical Announcement, December 21, 1981, 10 p.

Revised December 14, 1982

December 3, 1982

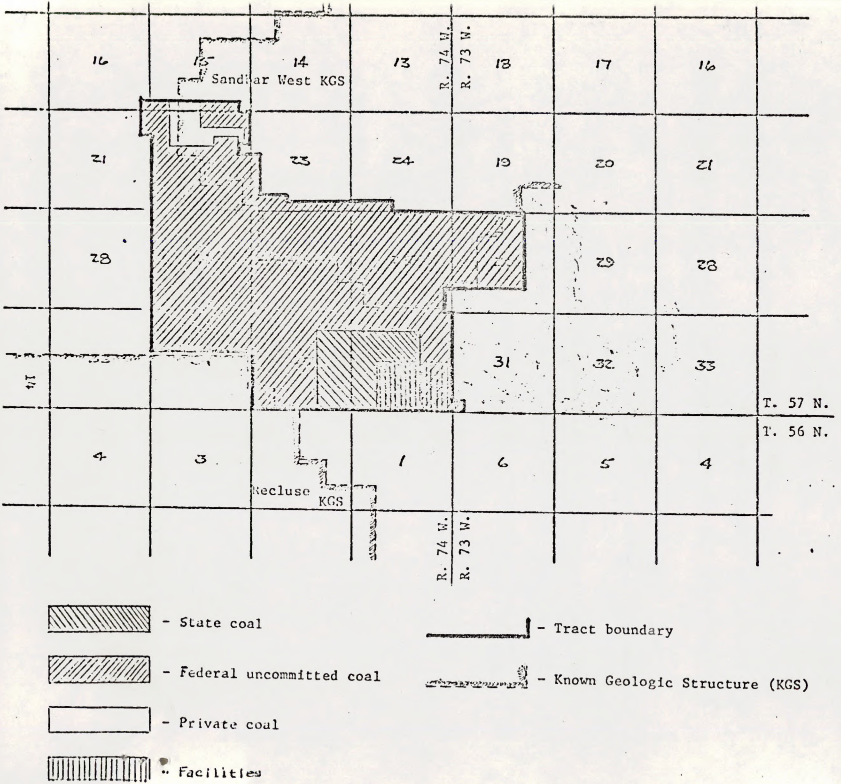
BITTER CREEK TRACT

Additional Information Requested By BLM

1. Surface Acreage That Will Be Disturbed - 4801* acres plus 320 acres for facilities
2. Location of Surface Facilities - See Attachment E.
3. Number of People That Will Be Employed - 380 permanent
   130 temporary
4. Mine Type - Surface, as stated in Tract Summary Report
5. Mining Technique - Truck and shovel, as stated in Tract Summary Report

*Approximate acres based only on projected survey of 7.5-minute quadrangles. Actual acres are less.

Revised December 23, 1982
Revised January 25, 1983



ATTACHMENT E

BITTER CREEK TRACT

Revised Dec. 14, 1982
Revised Jan. 25, 1983

LEGAL DESCRIPTION
BITTER CREEK TRACT

Federal Uncommitted Coal

T. 57 N., R 73 W.

Tract 42.
Tract 45.
Sec. 30: lot 5, lot 6, lot 7, lot 8, lot 13.

T. 57 N., R. 74 W.

Tract 44 excluding portion in conflict with tract 48.
Tract 44B excluding portion in conflict with tract 48.
Tract 44C.
Tract 44D excluding portion in conflict with tract 48.
Tract 50.
Tract 51 excluding portion in conflict with tract 49.
Tract 52.
Tract 53.
Tract 54.
Tract 55A.
Tract 55B.
Tract 55C.
Tract 55D.
Tract 55E.
Tract 55F.
Tract 55G.
Tract 55H.
Tract 60 excluding portion in conflict with tract 48.
Tract 61.
Tract 62.
Tract 63A.
Tract 63B.
Tract 63C.
Tract 63D.

T. 57 N., R 74 W.

Sec. 22: lot 1, lot 2, lot 3, lot 4, lot 5, NW1/4 SW1/4, S1/2 SW1/4, SW1/4 SE1/4.
Sec. 23: lot 3.
Sec. 25: lot 1, lot 2, lot 3, lot 9, lot 10, lot 11.
Sec. 26: lot 1, lot 2, lot 3, lot 4, lot 5, SE1/4 SW1/4.
Sec. 27: lot 1, lot 2, lot 3, lot 4, lot 5, lot 6, lot 7, N1/2 NW1/4, SW1/4 NW1/4, W1/2 SW1/4.
Sec. 34: lot 1, lot 2, NE1/4 NE1/4, NW1/4 NW1/4, S1/2 N1/2.
Sec. 35: lot 1, lot 2, lot 3, lot 4, lot 5, lot 6, lot 7, lot 8, lot 9, lot 10, lot 11, lot 12, NW1/4.
Sec. 36: lot 2, lot 3, lot 4, lot 5, lot 6, lot 7, lot 8, SE1/4 NE1/4.

Total Tract

T. 57 N., R. 73 W.

Tract 42.
Tract 45.
Sec. 30: lot 5, lot 6, lot 7, lot 8, lot 13.

T. 57 N., R. 74 W.

Tract 44A excluding portion in conflict with tract 48.
Tract 44B excluding portion in conflict with tract 48.
Tract 44C.
Tract 44D excluding portion in conflict with tract 48.
Tract 48 excluding portion in conflict with tracts 58A and 58 B.
Tract 50 excluding portion in conflict with tract 48.
Tract 51 excluding portion in conflict with tract 49.
Tract 52.
Tract 53.
Tract 54.
Tract 55A.
Tract 55B.
Tract 55C.
Tract 55D.
Tract 55E.
Tract 55F.
Tract 55G.
Tract 55H.
Tract 56.
Tract 60.
Tract 61.
Tract 62.
Tract 63A.
Tract 63B.
Tract 63C.
Tract 63D.

T. 57 N., R. 74 W.

Sec. 22: lot 1, lot 2, lot 3, lot 4, lot 5, NW1/4 SW1/4, S1/2 SW1/4, SW1/4 SE1/4.
Sec. 23: lot 3.
Sec. 25: lot 1, lot 2, lot 3, lot 9, lot 10, lot 11.
Sec. 26: lot 1, lot 2, lot 3, lot 4, lot 5, SE1/4 SW1/4.
Sec. 27: lot 1, lot 2, lot 3, lot 4, lot 5, lot 6, lot 7, N1/2 NW1/4, SW1/4 NW1/4, W1/2 SW1/4.
Sec. 34: lot 1, lot 2, NE1/4 NE1/4, NW1/4 NW1/4, S1/2 N1/2.
Sec. 35: lot 1, lot 2, lot 3, lot 4, lot 5, lot 6, lot 7, lot 8, lot 9, lot 10, lot 11, lot 12, NW1/4.
Sec. 36: lot 2, lot 3, lot 4, lot 5, lot 6, lot 7, lot 8, SE1/4 NE1/4.